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Multimorbidity is a game changer

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We generally analyse, classify, understand and teach diseases from the perspective of genetics, pathophysiology, anatomy, and then of course specific organ systems. However, patients nowadays accumulate multiple chronic conditions. If treated appropriately, hypertension, heart failure, diabetes, human immunodeficiency virus infection, some types of cancer and haematological malignancies, as well as many other diseases, have lost the fear of former times and have become chronic conditions, although many diseases with high rates of morbidity and mortality still exist. This success of medicine is still ongoing and increases the emergence of multiple chronic coincident conditions in a single patient, i.e., multimorbidity. This megatrend in medicine necessitates changes in ways to manage diseases, patients and institutions in health care.

In an article now published in the *Swiss Medical Weekly*, Aubert et al. [1] address thought-provoking issues concerning multimorbidity. The authors conducted a multicentre retrospective study in 42,739 patients discharged from general internal medicine departments in three major Swiss hospitals. They defined multimorbidity as ≥2 chronic diseases and found that 79% of the patients in these hospitals to be multimorbid, with a median of four chronic diseases per patient [1]. Nowadays, acute diseases mostly emerge from deterioration of chronic diseases, such as acute heart failure from chronic heart disease and acutely exacerbated chronic obstructive pulmonary disease (COPD) from chronic COPD. Yet this is not always the case. As stated by the authors, their estimate of the extent of multimorbidity may therefore even be an underestimation of its true prevalence, as acute diseases were excluded from some of their analyses. Also, retrospective analyses tend to underestimate the number of morbidities because treating physicians may have underreported those deemed irrelevant to the current hospitalisation.

On the other hand, just counting morbidities may lead to overestimating the challenges of multimorbidity. The National Library of Medicine (NLM, Pubmed) has recently defined the MESH term "multimorbidity" to be "the complex interactions of several co-existing diseases" [2], i.e., not the "accumulation of chronic or chronic and acute diseases". It would probably have been wise for the NLM to use a different term for this clinically relevant perspective on multimorbidity such as "complex multimorbidity". This definition of multimorbidity takes account of interactions between diseases, namely disease-disease interactions (DDIs) [2]. Examples of prevalent DDIs include hypertension and pain management with nonsteroidal anti-inflammatory drugs, gastrointestinal bleeding due to duodenal ulcer and the necessity for anticoagulation because of a mechanical heart valve, or high-dose corticosteroid therapy for asthma and concurrent diabetes [3]. In a small retrospective, single centre study with a prevalence of multimorbidity similar to the study by Aubert et al. [1], we found 49% of patients with multiple acute and chronic conditions to have more or less severe DDIs [4]. This latter percentage may also be an underestimate because of the retrospective design of our study. But whatever the perspective on multimorbidity or complex multimorbidity will be, the extent of this entity in healthcare settings is staggering and overwhelming in both in-patient [4] and out-patient [3] care. This requires much further detailed analysis of multimorbidity and complex multimorbidity as regards patients, institutions, healthcare in general, education and training.

In this vein, Aubert et al. demonstrated a very interesting analysis in figure 4 of their paper [1]. They put the four most prevalent comorbidities, occurring in ≥10% of the patients (chronic heart disease, chronic kidney disease, solid malignancy, substance-related disorders) at centre stage and precisely delineated a complex network of overlapping and interacting clusters of conditions. As suggested by the above-mentioned new definition of the NLM [2] and nicely shown in this complex analysis [1], multimorbidity is not only a quantitative concept. There are very specific, reproducible and sometimes singular disease combinations, i.e., disease clusters. The number of potential combinations is extremely high. Some are very prevalent [1], others again rare or even singular, i.e., finger-printable or personalisable. Clusters are not a coincidence [1, 3, 4]. They result from the prevalence of diseases, from genetics, and from behaviours or environmental as well as occupational influences. For example, smoking or the failure to stop smoking may be due to depression and/or generalised anxiety. Thus, smoking, or perhaps rather the failure to end it, may sometimes represent an attempt to control anxiety. However, smoking will also lead to atherosclerosis, COPD and cancer in various constellations. From a public health perspective, such clusters result from the failure to more aggressively address smoking or perhaps depression and anxiety as a most pressing health issue. Thus, substance-related disorders also coincide with heart disease, solid malignancy and lung disease (see figure 4 in the article by Aubert et al. [1]). Therefore, disease clusters need con-

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stant monitoring to better guide public health policy and intervention. Multimorbidity alters the perspective on disease management, case management and patient care. It calls for managing single diseases in the light of conflicting management of other diseases, as well as of patients with multiple diseases and conditions. It impacts on institutions and organisations of health care, especially as populations are aging and functional decline may form specific clusters with multimorbidity.

Since the 1950s we have seen an unprecedented and ever-increasing specialisation and fragmentation, perhaps even atomisation of health care. An endocrine organ of a very few grams and relatively few related diseases may be covered in a central hospital by a distinguished, highly respected specialist. A number of different specialists tending to each organ or disease will treat patients with complex multimorbidity. Unfortunately, doctors sometimes defer coordination between mutually exclusive management options to patients or their relatives in a badly adapted version of "patient choice". The fragmentation and disintegration of health and patient care may endanger clarity and leadership in guiding complex multimorbid patients. The care (or rather non-care?) for multimorbid patients has substantially contributed to ever increasing health costs. Thus, systems, institutions and caregivers serve complex multimorbid patients often inadequately and inefficiently. This requires some caregivers to very consciously specialise to ensure coherence, continuity and coordination in the care of complex multimorbid patients. The American College of Physicians in its concept paper on the "Advanced Medical Home" [5], the European Federation of Internal Medicine in its statement on training requirements for Internal Medicine [6] and proponents of general internal medicine at university and teaching hospitals in Switzerland [7] strongly advocate for recognised roles for general internists and hospitalists. Multimorbidity and interactions between multiple diseases (DDIs) require specific research and highly sophisticated know-how, and must be a highly respected specialisation by itself. These specialists together with other healthcare givers ought to organise care to lower the burden of multimorbidity for patients, institutions and health care in general. Complex multimorbidity is a reality now. The policy of health care, institutions and caregivers need to change the game, there is no choice.

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